

Analytical Chemistry
CHEMICAL TECHNOLOGY IN POTABLE WATER

Stephen F. Gnidovec

Illinois Valley Community College
815 North Orlando Smith Avenue
Oglesby, Illinois, 61348
Dr. Matthew Johll*

The purpose of my research paper is to test the effectiveness of two different methods of water treatment: oxidation and sequestering.

The first method of chemical water treatment tested was oxidation. Potassium Permanganate (KMnO_4) was the chosen oxidant. When Potassium Permanganate oxidizes a given metal, a precipitate will form and be filtered out. The filtrate should, therefore, have no traces of the given metal in solution. The two metals that Potassium Permanganate oxidized in this experiment were Iron and Manganese. For Iron to be properly oxidized, it is a 1:1 reaction. This means that for every 1 mg/L of soluble Iron, there needs to be 1 mg/L of Potassium Permanganate to properly oxidize all the soluble iron. However Manganese is a 1:2 reaction, meaning that for every 1 mg/L of soluble Manganese, there needs to be 2 mg/L of Potassium Permanganate to completely oxidize all of the soluble Manganese.

The second method of chemical water treatment tested was sequestering. A Polyphosphate was chosen as the sequestering agent. The purpose of sequestering is to keep the metal in solution so that it cannot be oxidized and fall out of solution. The Polyphosphate surrounds the metal, providing a barrier between the metal and an oxidant. Sequestering can only be conducted under very small concentrations; this is because the metals are still in the water. A weak oxidant, chlorine, was added to the sequestered water. The chlorine was used to test to see if the sequestering agent worked. If it did not work, then a precipitate would be found in the water. Sequestering, in effect, “hoodwinks,” or masks, the taste and sight of insoluble metal. Both Manganese and Iron are a 1:1 reaction meaning that for every 1 mg/L of soluble Iron or Manganese, 1 mg/L of Polyphosphate must be added to properly sequester the metals in the water. The maximum amount of Iron and Manganese that can be sequestered is 5 mg/L.

The experiments proved that oxidation and sequestering were both effective chemical means of water treatment.